

# TROVIS 6600 Automation System

## TROVIS 6610 CPU Module

SAMSON



MEMBER OF  
ASHRAE **BACnet**  
INTEREST GROUP EUROPE

## Mounting and Operating Instructions



**EB 6610 EN**

Edition June 2010

## Definition of signal words



### **DANGER!**

*Hazardous situations which, if not avoided, will result in death or serious injury*



### **NOTICE**

*Property damage message or malfunction*



### **WARNING!**

*Hazardous situations which, if not avoided, could result in death or serious injury*



### **Note:**

*Additional information*



### **Tip:**

*Recommended action*

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**Note:**

*The TROVIS 6610 CPU Module is a component from the TROVIS 6600 Automation System.*

*The **Application Notes AB 6600 EN** describe in detail the system integration of TROVIS 6610 CPU Module together with the other components of the TROVIS 6600 Automation System (TROVIS 6620 I/O Module, TROVIS 6625 Input Module, TROVIS 6615 Web Terminal).*

*These Application Notes are included in the online documentation of TROVIS 6690 Graphical Project Management Tool and are available on request.*

### 1 General safety instructions

- The TROVIS 6610 CPU Module is to be mounted, started up or operated only by trained and experienced personnel familiar with the product. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- The TROVIS 6610 CPU Module has been designed for use in electrical power systems. For wiring and maintenance, you are required to observe the relevant safety regulations.
- Proper shipping and storage are assumed.

## 2 Overview of the TROVIS 6600 Automation System

The TROVIS 6600 Automation System consists of self-contained automation stations. These include a TROVIS 6610 CPU Module, TROVIS 6620 I/O Modules, TROVIS 6625 Input Modules and optional TROVIS 6615 Web Terminals. The visualization software usually runs under Microsoft Windows® operating system.

A system can process over 20,000 physical data points. The TROVIS 6620 I/O Modules and TROVIS 6625 Input Modules are peripheral devices which communicate with the TROVIS 6610 CPU Module over RS-485. The TROVIS 6610 CPU Modules communicate with each other as well as with the control station over Ethernet (BACnet/IP, BACnet/PTP, TCP/IP or Modbus).

The highly flexible modules are suitable for implementing cost-effective solutions. DDC concepts with a high degree of distribution within a network are easy to implement.

### 2.1 System overview

Components in the system	
Control station	TROVIS-LS
Operating stations	TROVIS-BS
CPU module	TROVIS 6610 (various models)
I/O module	TROVIS 6620 (various models)
Input module	TROVIS 6625
Web terminal	TROVIS 6615
Associated software	
Operating system	Usually Windows®
Process visualization	e.g. Wonderware InTouch
Graphical project management tool	TROVIS 6690
DA server	TROVIS 6691
OPC server	TROVIS 6692
Accessories	
End-of-line termination	1 400-9561 (2x included in the scope of delivery)
Single-port bus hub	1 400-6169
Four-port bus hub	1 400-7140

Modbus master cable	1400-9748
Modbus slave cable	1400-9749
Serial connecting cable	1400-9750
Cable converter for two-wire circuit	1400-8800
Cable converter for four-wire circuit	1400-7308
Terminals for TROVIS 6610	1991-0133
Terminals for TROVIS 6620	1991-0134

## 2.2 Max. number of units

Modules
32 TROVIS 6610 CPU Modules per system
32 TROVIS 6620 I/O Modules/TROVIS 6625 Input Modules per TROVIS 6610 CPU Module
TROVIS 6610 CPU Module
<p>40 physical data points including:</p> <ul style="list-style-type: none"> <li>20 universal inputs, which are set individually for each input: <ul style="list-style-type: none"> <li>– Analog input: Pt 1000/–40 to 160 °C/0 to 2000 Ω also 0 to 10 V for TROVIS 6610-0001 and higher</li> <li>– Binary input including channel 1 and 2 as counter inputs up to 1 kHz (1:1)</li> </ul> </li> <li>12 binary outputs · 2 A, 250 V AC (inductive)</li> <li>8 analog outputs · 0 to 10 V</li> </ul>
TROVIS 6620 I/O Module
<p>20 physical data points including:</p> <ul style="list-style-type: none"> <li>10 universal inputs, which are set individually for each input: <ul style="list-style-type: none"> <li>– Analog input: Pt 1000/–40 to 160 °C/0 to 2000 Ω also 0 to 10 V for TROVIS 6620-0001 and higher</li> <li>– Binary input including channel 1 and 2 as counter inputs up to 1 kHz (1:1)</li> </ul> </li> <li>6 binary outputs · 2 A, 250 V AC (inductive)</li> <li>4 analog outputs · 0 to 10 V</li> </ul>
TROVIS 6625 Input Module
20 binary inputs

## 2.3 Network expansion (without repeaters, hubs etc.)

Ethernet	100BASE-T typ. LAN
I/O bus	1200 m

## 2.4 Cable recommendation

24 V AC	1.5 mm <sup>2</sup> stranded wire
Ethernet	Min. Cat 5 cable, shielded (STP)
I/O bus	Jy(St) Y 2 x 2 x 0.8

## 2.5 Power supply

24 V AC, max. 210 VA for
– One TROVIS 6610 CPU Module and
– A total of 32 TROVIS 6620 I/O Modules and/or TROVIS 6625 Input Modules

### 3 Notes concerning TROVIS 6610 CPU Module

The TROVIS 6610 CPU Module can only be used if it has been integrated into a building automation system to perform its tasks using the TROVIS 6690 Graphical Project Management Tool.

In addition, restricted functional operation over a web interface is also possible. The standard IP address necessary to activate the web server is written on the nameplate of the module.

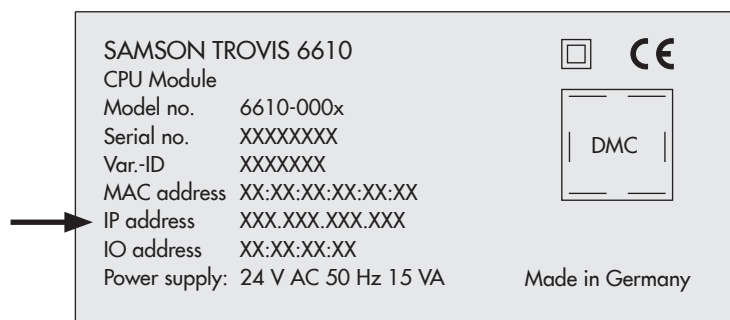


Fig. 1: Nameplate of TROVIS 6610 CPU Module with IP address

#### 3.1 Network settings

The TROVIS 6610 CPU Module is delivered without any plant operating software. The MAC address as well as the IP address are written on the left-hand side of the nameplate.

The subnet mask is 255.255.0.0. A gateway has not been entered. To change the network settings on a computer, the computer must be in the same subnet as the TROVIS 6610 CPU Module concerned. Example:

	TROVIS 6610 CPU Module	Computer or notebook
IP address:	172.30.245.10	172.30..XXX.XXX
Subnet mask:	255.255.0.0	255.255.0.0
Gateway:	0.0.0.0	0.0.0.0



## 4 Technical data

<b>Power supply</b>	
Power supply	24 V AC (20.4 to 27.6 V AC)
Frequency range	48 to 62 Hz
Power consumption	15 VA
Connection	2-pin screw clamp terminal (green) Max. 2.5 mm <sup>2</sup> wire cross-section
<b>Temperature range</b>	
Operation	0 to 55 °C
Transportation and storage	-20 to 70 °C
Relative humidity	Normal, no dew formation
<b>Electromagnetic compatibility</b>	
Noise emission	According to EN 61000-6-3
Noise immunity	According to EN 61000-6-2
<b>Device safety</b>	
Class of protection	II according to EN 61140: 2003
Overvoltage category	II according to EN 60664-1
Degree of contamination	2 according to EN 60664-1
Degree of protection	IP 20 according to IEC 60529
<b>Installation</b>	
Dimensions including terminals (mm)	W x H x D: 185 x 130 x 60
Weight	Approx. 0.7 kg
Mounting	On rails (all DIN and EN types)
I/O connections	Screw clamp terminals Max. 2.5 mm <sup>2</sup> wire cross-section

## 20 universal inputs including two counter inputs (channels 1 and 2)



### Note:

*There is no galvanic isolation between inputs and to the analog outputs!*

### When used as binary inputs:

Power supply to binary inputs	Internally powered, approx. 10 V DC
Measuring current in short circuit	500 $\mu$ A
Input load	Max. 100
Minimum pulse length (1:1) (channels 1 and 2)	> 0.5 ms (< 1 kHz) > 500 ms (TROVIS 6610-0001 only)
Counter pulse	Positive edge triggered
Minimum pulse length (channels 3 to 20)	1 s
LED on the module for counter inputs	ON = Contact made or < 0.4 V OFF = Contact open or > 4 V
LED on the module for binary inputs	ON = Contact made or < 0.05 V OFF = Contact open or > 1 V

### When used as analog inputs:

#### Sensor

Type of sensor	Pt 1000 in two-wire connection
Input range	-40 to +160 °C
Resolution	10 bit
Accuracy	< 0.5 % of measuring range
Temperature influence	< 0.1 % of measuring range per 10 K
Measuring current	500 $\mu$ A

#### Resistance

Input range	0 to 2000 $\Omega$ , two-wire connection
Resolution	10 bit
Accuracy	< 0.1 % of measuring range
Temperature influence	< 0.05 % of measuring range per 10 K
Measuring current	500 $\mu$ A

<b>Voltage (TROVIS 6610-0001 and higher)</b>	
Input range	0 to 10 V DC
Resolution	10 bit
Accuracy	< 0.5 % of measuring range
Temperature influence	< 0.04 % of measuring range per 10 K
Input resistance	10 k $\Omega$
<b>12 binary outputs</b>	
Power rating of relay	250 V AC, 2 A inductive load 250 V AC, 3 A resistive load
<b>8 analog outputs</b>	
Output range	0 to 10 V DC
Resolution	10 bit
Accuracy	< 0.5 % of measuring range
Temperature influence	< 0.03 % of measuring range per 10 K
Permissible load	> 3.3 k
Short-circuit current	5.5 mA
<b>Indication</b>	
LED status indication	Binary input and output CPU operation and malfunction Communication (Rx/Tx) for each interface

Interfaces	
Host level/TROVIS 6610 CPU Module	
Specification	According to IEEE 802.3
Transmission rate	10/100 MBit/s
Protocol	TCP/IP
Connection	RJ-45, 8-pole
I/O bus	
Specification	RS-485 Two-wire, polarity insensitive
Galvanic isolation	Yes
Transmission rate (kBit/s)	9.6, 19.2, 38.4, 57.6, 115.2
Protocol	SAMSON
Connection	3-pin screw clamp terminal (green) Max. 2.5 mm <sup>2</sup> wire cross-section
RS-232	
Specification	RS-232 with RTS/CTS control lines
Galvanic isolation	No
Transmission rate (kBit/s)	9.6, 19.2, 38.4, 57.6, 115.2
Connection	RJ-45, 8-pole
Modbus	
Specification	RS-485 · Four-wire; two-wire over external jumper
Galvanic isolation	Yes
Transmission rate (kBit/s)	9.6, 19.2, 38.4, 57.6, 115.2
Protocol	Modbus RTU (master or slave)
Connection	RJ-45, 8-pole
USB	
Specification	2 x USB 2.0 full speed 12 Mbit/s Memory pen, modem (USB mass storage, USB CDC/ACM)

## 5 Installation

- Write down the IP address of the TROVIS 6610 CPU Module (nameplate, see Fig. 1 on page 8) before installing it as the IP address will be needed later on during the system integration.

### Configuration



#### Note:

- In **TROVIS 6610-0001**, the DIP switches are used to determine how a universal input is to be used. The DIP switches allow the input to be set either as a binary, sensor or resistance input or as a voltage input.
- In **older models**, the universal input cannot be configured as a voltage input. Therefore, configuration is not required.
- In **newer models**, the universal inputs are configured in the TROVIS 6690 Graphical Project Management Tool.

The DIP switches for module configuration are located at the back of the module. Therefore, the module must be configured first before installation.

Each universal input has to be configured separately. The first block of switches configures universal inputs 1 to 10 (labeled correspondingly) while the second block of switches configures universal inputs 11 to 20.

The following switch positions apply:

- ON: Configuration of the universal input as a binary, sensor or resistance input
- OFF: Configuration of the universal input as a voltage input

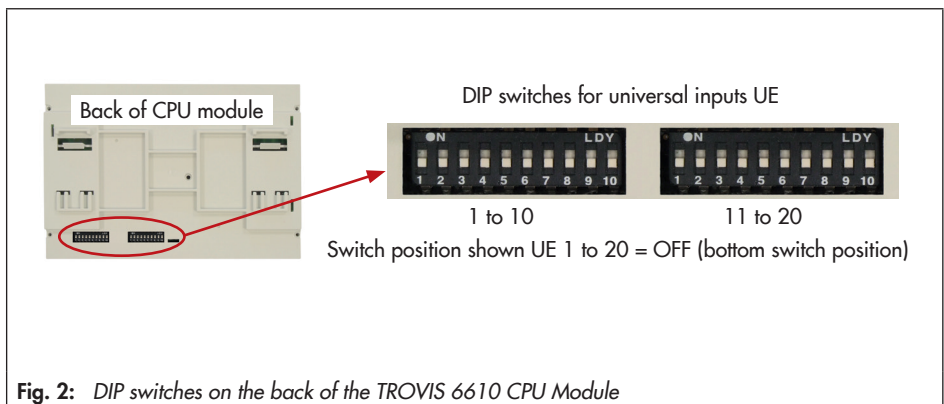


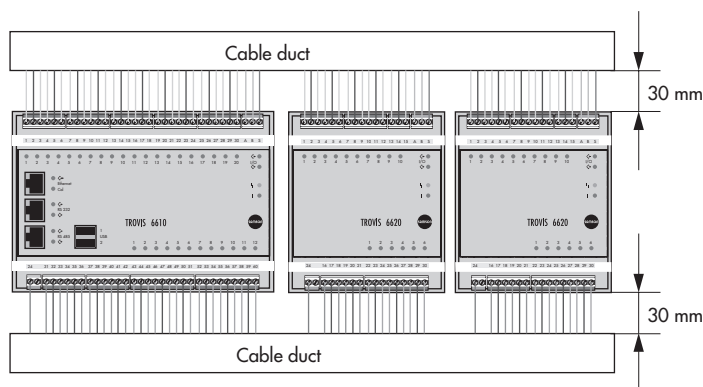
Fig. 2: DIP switches on the back of the TROVIS 6610 CPU Module

### Installation

The following points apply on installing the module:

- ➔ All modules are equipped with a fixture base for rail mounting TS 35.
- ➔ Keep a minimum distance of 30 mm between the module terminals and the cable duct (see Fig. 3)!
- ➔ As a rule, the modules are installed in a separate instrumentation cabinet.
- ➔ First hook the modules on the top of the rail and press down.

Installation directly in the power unit is also possible, provided sufficient shielding is ensured by using a separating metal plate.

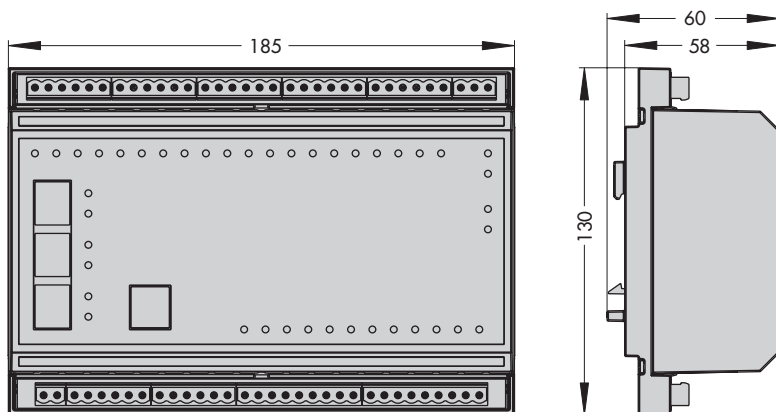


**Fig. 3:** Minimum distance to be kept between modules and cable duct  
(in example shown: one TROVIS 6610 CPU Module and two TROVIS 6620 I/O Modules)

### Removal

- ➔ Use a screwdriver to lever the latching downwards located underneath the module to detach it from the rail.

## 5.1 Installation dimensions



**Fig. 4:** *Installation dimensions of the TROVIS 6610 CPU Module*

## 6 Electrical connection

### 6.1 Power line

The TROVIS 6600 Automation System is supplied with a 24 V AC power supply.

The voltage supply must be scaled to match the power consumption of all connected modules (see section 6.2).

Use two-core wire-end ferrules for the voltage supply wiring to ensure that the other modules remain connected when a module is disconnected from the power supply (see Fig. 5).



#### **NOTICE!**

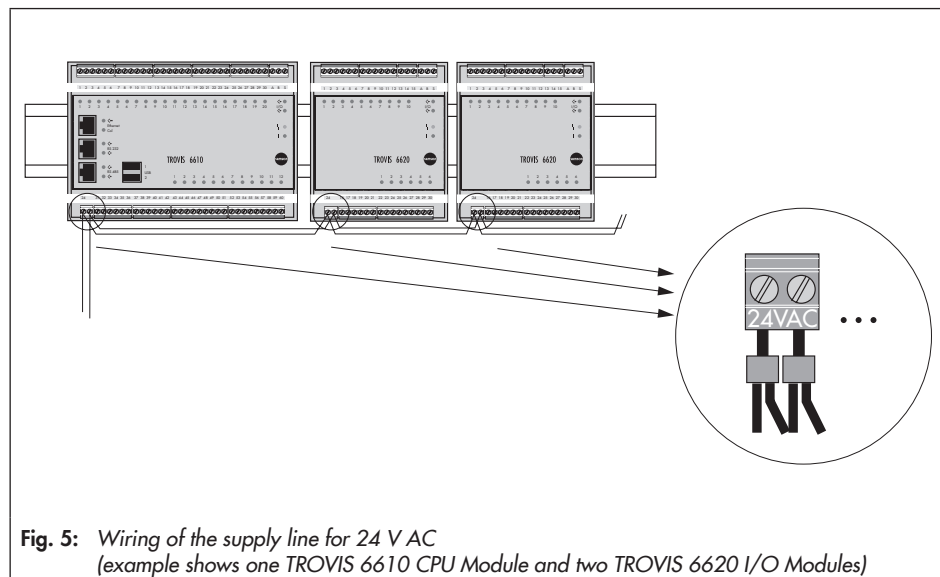
*Damage to the module due incorrect wiring!*

*Do not connect the ground terminals from one module to another module!*



#### **Tip:**

*SAMSON recommends the use of surge arresters to prevent damage from voltage spikes.*



**Fig. 5:** Wiring of the supply line for 24 V AC  
(example shows one TROVIS 6610 CPU Module and two TROVIS 6620 I/O Modules)



## 6.2 Scaling of the voltage supply

A maximum of 32 TROVIS 6620 I/O Modules and/or TROVIS 6625 Input Modules can be connected to one TROVIS 6610 CPU Module. The voltage supply of all modules is 24 V AC.

### Power consumption of single modules

Module	Voltage	Power consumption
TROVIS 6610 CPU Module	24 V AC	15 VA
TROVIS 6620 I/O Module	24 V AC	6 VA
TROVIS 6625 Input Module	24 V DC	8 VA

### Total power consumption of all connected modules

Type	Qty.	Power consumption	Total power consumption
TROVIS 6610 CPU Module	...	15 VA	... VA
TROVIS 6620 I/O Module	...	6 VA	... VA
TROVIS 6625 Input Module	...	8 VA	... VA
		Total	... VA
		10 % reserve	... VA
		<b>Total</b>	... VA

### Voltage drop in the supply line

The larger the reduced power from the voltage supply, the larger the drop in voltage or power on the line. The voltage drop is calculated as follows:

$$U_{RL} = \frac{2 \times L \times P}{\kappa \times A \times U_S}$$

$U_{RL}$ : Voltage drop in a two-way circuit [V]

$L$ : One-way circuit length of the supply line [m]

$P$ : Power drawn from the voltage supply [VA]

$\kappa$ : Material constant (kappa); for copper 57 [m/Ω x mm<sup>2</sup>]

$A$ : Wire cross-section [mm<sup>2</sup>]

$U_S$ : Power supply of the system; in this example 24 V

### Recommended power line length for high performances

In order to guarantee the power supply of the system, the lower tolerance limit of the transformer as well as the lower tolerance limit of the system must be taken into account.

$$L_{\max} = \frac{U_{RL} \times \kappa \times A \times U_{\text{transformer}}}{2 \times P}$$

$L_{\max}$ : Maximum permissible line length (one-way)

$U_{RL}$ : Permissible voltage drop (in this example 3.6 V)

$\kappa$ : Material constant (kappa); for copper 57 [m/Ω × mm²]

$A$ : Wire cross-section [mm²]

$U_{\text{transformer}}$ : Secondary voltage of the transformer (24 V AC)

$P$ : System's required power (consuming device)

## 6.3 Terminal assignment

Wiring is connected over screw terminals for a max. 2.5 mm² wire cross-section.

Terminal	Channel	Connections of the TROVIS 6610 CPU Module
1	1	UE/ZE1
2		GND
3	2	UE/ZE2
4	3	UE
5		GND
6	4	UE
7	5	UE
8		GND
9	6	UE
10	7	UE
11		GND
12	8	UE
13	9	UE
14		GND
15	10	UE
16	11	UE

Terminal	Channel	Connections of the TROVIS 6610 CPU Module
17		GND
18	12	UE
19	13	UE
20		GND
21	14	UE
22	15	UE
23		GND
24	16	UE
25	17	UE
26		GND
27	18	UE
28	19	UE
29		GND
30	20	UE
A		RX/TX A
B		RX/TX B
S		Shielding
24 V AC	24 V AC 15 VA	Power supply
31	21	AA
32		GND
33	22	AA
34	23	AA
35		GND
36	24	AA
37	25	AA
38		GND
39	26	AA
40	27	AA

Terminal	Channel	Connections of the TROVIS 6610 CPU Module
41		GND
42	28	AA
43	29	BA
44		Supply of channels 29 and 30
45	30	BA
46	31	BA
47		Supply of channels 31 and 32
48	32	BA
49	33	BA
50		Supply of channels 33 and 34
51	34	BA
52	35	BA
53		Supply of channels 35 and 36
54	36	BA
55	37	BA
56		Supply of channels 37 and 38
57	38	BA
58	39	BA
59		Supply of channels 39 and 40
60	40	BA

## 7 Licences

The following listed licenses partly apply to the software technologies and programs used in the TROVIS 6610 CPU Module. The source code of the parts of the TROVIS 6610 firmware which are bound to these licenses can be requested from SAMSON or can be found in the Internet ► [www.samson.de/support/deser031.htm](http://www.samson.de/support/deser031.htm).

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Version 2.1, February 1999

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## 8 BACnet certificates



### GRANT TO USE THE BTL-MARK

The BACnet Interest Group Europe (BIG-EU) grants

**SAMSON AG**

the right to use the BTL mark for BACnet  
conformance tested products for the BACnet conformance of

**TROVIS**

**6610**

with

Firmware revision: SAMSON BACstack 1.6

BACnet protocol revision: 4

Device profile: B-BC



The right is granted according to the listing rules of the BACnet Interest Group Europe based on the test report no. 08.61.SAM.001.1 issued by WSPLab.

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Dortmund, April 6<sup>th</sup>, 2008  
The Executive Board of the BIG-EU

A handwritten signature in blue ink.

Volker Röhl

A handwritten signature in blue ink.

William O. Swan

A handwritten signature in blue ink.

Roger Braun

A handwritten signature in blue ink.

Gijs de Koning

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# WSPCert Certificate

**No. BAC-0105-01**

WSPCert attests the conformance of the following BACnet implementation to the BACnet standard ISO 16484-5:2012. The attested conformance refers to the BACnet Interoperability Building Blocks (IBBs) listed in the annex of this certificate.

The BACnet Building Controller (B-BC)  
**TROVIS 6610 Automation Station  
6610-0002**

with the software version:  
**SAMSON BACstack 2.0**

of  
**SAMSON AG**  
Postfach 10 19 01, 60019 Frankfurt a.M., Germany

has fulfilled the requirements according to the test standard ISO 16484-6, the BTL Test Plan 12.0 and the Certification Rules of the BACnet Interest Group Europe, see **MBS Test Report No. VG 2012\_7573**.

The certificate is valid  
until 2015/04/01

2013/11/04

Date of initial certification



Dipl.-Ing. G. Weinmann  
Head of Certification Body



WSPCert Dr.-Ing. Frank Bitter  
Kapuzinerweg 7, 70374 Stuttgart, Germany,  
phone: +49 (0)711 9539220, email: info@wspcert.de

Certification body  
accredited by the DAkkS  
according to EN 45011





## Annex to Certificate No. BAC-0105-01

The certification of the BACnet Implementation  
**TROVIS 6610-0002 Automation Station**  
 of **SAMSON AG**

refers to the BACnet Interoperability Building Blocks (BIBBs) listed below. BIBBs other than listed are not part of the certification.

BACnet Interoperability Building Blocks	
DS-RP-A	Data Sharing – Read Property – A
DS-RP-B	Data Sharing – Read Property – B
DS-RPM-A	Data Sharing – Read Property Multiple – A
DS-RPM-B	Data Sharing – Read Property Multiple – B
DS-WP-A	Data Sharing – Write Property – A
DS-WP-B	Data Sharing – Write Property – B
DS-WPM-B	Data Sharing – Write Property Multiple – B
DS-COV-A	Data Sharing – COV – A
DS-COV-B	Data Sharing – COV – B
AE-N-I-B	Alarm and Event – Notification Internal – B
AE-N-E-B	Alarm and Event – Notification External – B
AE-ACK-B	Alarm and Event – Acknowledge Alarm – B
AE-ASUM-B	Alarm and Event – Alarm Summary – B
AE-ESUM-B	Alarm and Event Management – Event-Enrollment Summary – B
AE-INFO-B	Alarm and Event – Information – B
SCHED-I-B	Scheduling – Internal – B
SCHED-E-B	Scheduling – External – B
T-VMT-I-B	Trending – Viewing and Modifying Trends Internal – B
T-VMT-E-B	Trending – Viewing and Modifying Trends External – B
T-ATR-B	Trending – Automated Trend Retrieval – B
DM-DDB-A	Device Management – Dynamic Device Binding – A
DM-DDB-B	Device Management – Dynamic Device Binding – B
DM-DOB-B	Device Management – Dynamic Object Binding – B
DM-DCC-B	Device Management – Device Communication Control – B
DM-ATS-A	Device Management – Automatic Time Synchronization – A
DM-TS-A	Device Management – Time Synchronization – A
DM-TS-B	Device Management – Time Synchronization – B
DM-UTC-A	Device Management – UTC Time Synchronization – A
DM-UTC-B	Device Management – UTC Time Synchronization – B
DM-RD-B	Device Management – Reinitialize Device – B
DM-BR-B	Device Management – Backup and Restore – B
DM-R-B	Device Management – Restart – B
DM-LM-B	Device Management – List Manipulation – B
DM-OC-D-B	Device Management – Object Creation and Deletion – B

**AMEV**Mechanical and Electrical Engineering Working  
Party of National, Regional and Local Authorities**WSPCert**

BACnet CERTIFICATION BODY

**AMEV attestation for certified BACnet devices**

1. The following BACnet device is certified as per DIN EN ISO 16484-5:

Supplier	SAMSON AG		
Product name	TROVIS 6610 Automationsstation		
Product model number	6610-0002		
Standard device profile	B-BC	BACnet protocol vers. / rev.	1.12
Firmware revision	SAMSON BACstack 2.0		

Data Link Layer options	<input checked="" type="checkbox"/> BACnet IP (Annex J)	<input type="checkbox"/> BACnet over LonTalk
	<input type="checkbox"/> BACnet MS/TP master	<input type="checkbox"/> BACnet MS/TP slave
	<input type="checkbox"/> MS/TP baud rates: .....	
	<input type="checkbox"/> .....	
Static address binding	<input type="checkbox"/> Yes (for MS/TP only)	
Network options	<input checked="" type="checkbox"/> BBMD	<input checked="" type="checkbox"/> Reg. by foreign devices
	<input type="checkbox"/> Router, medium:	
Character sets	<input checked="" type="checkbox"/> UTF-8	<input checked="" type="checkbox"/> ANSI X3.4
Reporting options	<input checked="" type="checkbox"/> Intrinsic reporting	<input checked="" type="checkbox"/> Algorithmic reporting

2. The device supports BACnet functions as per AMEV profile:

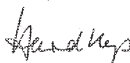
<input type="checkbox"/> AMEV profile AS-A (Automation station, base version)	As of: .....
<input checked="" type="checkbox"/> AMEV profile AS-B (Automation station, extended version)	As of: V1.1 21.08.2012
<input type="checkbox"/> AMEV profile .....	As of: .....

3. Basis for AMEV attestation:

<input checked="" type="checkbox"/> Test report of test lab MBS dated 07.11.2013 number VG 2012_7573
<input checked="" type="checkbox"/> AMEV recommendation BACnet 2011 V1.1 As of: 21.08.2012 (see <a href="http://www.amev-online.de">www.amev-online.de</a> )

4. The AMEV attestation is only valid in combination with the certificate:

<input checked="" type="checkbox"/> Certificate number BAC-0105 (see <a href="http://www.big-eu.org/conformance/eu/index.php">http://www.big-eu.org/conformance/eu/index.php</a> )
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(location, date)  
Düsseldorf, 28.11.2013

(AMEV chairman BACnet)

**WSPCert**Dr.-Ing. Frank Bitter  
Kappelerweg 7  
D-70874 Stuttgart  
Telefon +49 711 953922-0  
Telefax +49 711 953922-66

(BACnet certification body)





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samson@samson.de · [www.samson.de](http://www.samson.de)

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